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DISEASES OF THE NERVOUS SYSTEM

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

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VOL. XI DECEMBER 1950 No. 12

Published monthly by
PHYSICIANS POSTGRADUATE PRESS
277 Broadway, New York 7, New York

EDITORIAL OFFICES
UNIVERSITY OF TEXAS SCHOOL OF MEDICINE
800 Avenue B., Galveston, Texas

Entered as second-class matter at the Post Office at New York, N. Y.

DISEASES of the NERVOUS SYSTEM

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

Evaluation of Vitamin E Therapy In Psychiatric Disorders

SIMON STONE, M.D.
Manchester, N. H.

Considerable animal experimental evidence has been accumulated to place vitamin E in the group of accessory substances required to assure proper function of the endocrine system,[1] mesenchymal tissue derivatives, including blood vessels,[2] muscle, fibrous tissue and collagen matrix,[3] for cholesterol and fat metabolism[4] and for the maintenance of proper myelinization of the nervous system.[5] Deprivation results have varied considerably in different animal species and even in the same species, the variation depending on the sex of the animal and age at which the deficiency developed and the time of its termination.

Numerous conflicting reports have also appeared in the last decade on the therapeutic application of vitamin E in a large variety of human disorders including muscular dystrophies and atrophies,[6] demyelinization states,[7] hydrocephalus,[8] lupus erythematosus,[9] dermatomyositis,[10] heart disease,[11] atrophic arthritis,[12] fibrositis,[13] interstitial keratitis,[14] retrolental fibroplasia,[15] and muscular hypotonias.[16]

Christy[17] in 1945 reported on the successful use of alpha tocopherol in 10 mg. doses 2-3 times daily for the relief of menopausal vasomotor symptoms. Seven out of 25 patients experienced complete relief of symptoms and 16 patients reported very marked relief. No changes in vaginal mucosa or endometrium were observed in any of the cases treated and this would suggest that improvement was not due to estrogenic stimulation.

Ferguson[18] also observed good results in 66 patients who received 15-30 mg. of alpha tocopherol daily, with complete relief of vasomotor symptoms after 5-8 months of therapy in 44 patients. In a similar group of 66 patients using 20-100 mg. of alpha tocopherol daily, Finkler[19] reported excellent results in 31 cases, fair results in 16 cases, and unimpressive results in 19 cases. There was again no effect on vaginal epithelium in contrast to that observed following estrogenic medication.

In 1946 Michael and Ruggles[20] analyzed the results of administration of 50 mg. of mixed tocopherols, once or several times daily, to a group of institutionalized patients in a private psychiatric hospital. Two patients, one a case of dementia praecox, mixed type, and the other with a manic depressive, depressive psychosis benefited sufficiently under treatment to be discharged home. The case with the depression relapsed, however and had to be returned to the hospital where lasting recovery followed electroshock therapy. Definite improvement resulted in 2 cases of involutional melancholia, one case of unclassified psychosis and in 2 cases of psychosis with cerebral arteriosclerosis. In 12 patients some intensification of the preexisting symptoms followed therapy as a result of increased psychomo-

From the Neuropsychiatric Service of the Elliott Hospital, Manchester, N. H., the New Hampshire State Hospital, and the Convulsive Disorder Clinic of the New Hampshire State Department of Health.

tor activity ,and two patients became definitely worse with tocopherol medication. The authors felt that the number of complete remissions following tocopherol medication was not significantly greater than that of expected spontaneous remissions.

For the last 12 years I have attempted to evaluate the therapeutic efficacy of vitamin E in over 2800 patients with various neurologic and psychiatric disorders. The vitamin E was at first administered in the form of wheat germ oil, 4-8 cc. daily, alone or in combination with a vitamin B complex mixture. Since the introduction of vitamin E concentrates in 1940, I have been administering it in the form of 50 mg. capsules of natural mixed tocopherols, one every other day to three capsules daily. Some patients have received for a time 4-6 capsules (200-300 mg.) daily, but I have seen no advantage in administering the larger dosage although it has been well tolerated. The only side effects noted were complaints of "dizziness" or lightheadedness expressed by some patients, which usually disappeared when medication was discontinued and in several instances did not recur when administration was resumed. Skin eruptions were occasionally observed after prolonged administration, and the rash resembled lichen planus in 4 cases who have been under vitamin therapy for 6 months or longer. This again disappeared when the tocopherols were omitted. Aggravation of a preexistent case of psoriasis was also observed in one case.

The cases treated included hospitalized psychotic patients and patients with epilepsy at the New Hampshire State Hospital, epileptic patients treated at the New Hampshire Department of Health convulsive disorder clinic, patients with various neuropsychiatric disorders hospitalized in a general hospital for diagnosis or electroshock therapy, and office patients seen in the general practice of neuropsychiatry.

A number of these patients have continued to receive 50 mg. mixed tocopherols daily for several years with no evidence of ill effect. One patient with latent neurosyphilis has been taking 50 mg. of tocopherols every other day for a period of 7 years without supervision, with what he considered considerable benefit as far as his general health was concerned. In most cases it was combined with standard multivitamin or vitamin B complex capsules. As it is the common experience in psychiatric practice the majority of these patients have been under a general physician's care before consulting a psychiatrist and have received ample parenteral and oral vitamin therapy, including parenteral estrogen medication if any slight irregularity in menstrual cycle has taken place, besides the usual trial on analeptic drugs and sedatives. In many such cases the mixed tocopherols were added to the other vitamin capsules these patients were already receiving. No parenteral estrogen therapy was administered to any of the cases ,although oral estrogens in small doses were used when needed to control disagreeable vasomotor symptoms. The analeptic drugs such as amphetamine, dextroamphetamine and desoxyephedrine were used when the condition warranted their administration, frequently in combination with 1/8—1/4 grain of sodium amytal several times daily.

Results

The effects of the administration of the mixed tocopherols were general and specific. The immediate general reaction was similar to that reported following the administration of analeptic drugs such as amphetamine but usually did not become apparent for 3-8 days. These included ability to carry on with the usual daily tasks without becoming as much fatigued as formerly, experiencing less annoyance over minor irritants, improvement in digestion, greater tolerance to minor infections and greatly improved sense of well-being. The response is more gradual than that experienced following amphetamine ingestion and only a few patients felt dependent on the medication after a certain plateau of well-being had been reached. Discontinuation of the medication for a week or ten days would bring on in some cases a feeling of letdown and an awareness of tiring more easily, similar somewhat to that observed with amphetamine medication but to a much lesser degree. In contrast with the latter it also has the advantage of freedom from side effects such as cardiac palpitation, elevation of blood pressure, restlessness, or greatly increased psychomotor activity such as is not

uncommonly experienced with analeptic drug therapy. The possibility of placebo effect was also definitely ruled out as these patients were never informed about the contents of the capsules, the reason for their administration, nor the expected reaction. The family's comments were usually corroborative, namely that the patient is adjusting better at home, less irritable, more amenable to suggestion and easier to deal with, also less apt to complain about former physical discomforts. Side observations included a more rapid restoration of hair texture to normal with a lesser incidence of graying hair following coincidental tocopherol therapy in several patients who had in the past developed recurrent patchy alopecia with illnesses or pregnancies. In one case of sterility, pregnancy followed 2 years of tocopherol therapy, and in another case after 6 months of tocopherol ingestion. Both patients were previously informed by competent gynecologists that pregnancy would be rather unlikely because of hypogenitalism.

The results from mixed tocopherols administration in the involutional melancholia group of hospitalized psychotic patients paralleled that reported by Michael and Ruggles.[20] I have not observed any recoveries in these cases which one could directly attribute to tocopherol administration. In 22 patients with involutional depression in private practice after administration of 50-100 mg. of mixed tocopherols daily for periods lasting from 3 weeks to 3 months nearly all these patients reported some improvement in their physical well-being. Five of the milder cases recovered without electroshock therapy. However, seventeen of the more severely affected cases required electroshock therapy to bring forth recovery.

In spite of the optimistic reports of Christy,[17] Ferguson,[18] and Finkler[19] the effect on the vasomotor symptoms of the menopause was not too impressive and in cases with more distressing hot flashes small doses of estrogens had to be combined with the mixed tocopherol therapy to bring complete relief. It is probable, however, that the relief of vasomotor symptoms reported by the above authors was to some extent due to the improvement in the sense of well-being of these patients produced by the tocopherols and concomitant greater tolerance to their discomfort. As one is well aware these symptoms gradually disappear without medication or with the aid of mild sedation. I have observed, however, that lesser amounts of estrogens were required to bring complete control. Also nonpsychotic perimenopausal tension states and mild depressive reactions without self-accusatory features responded well in most instances to administration of 50-100 mg. of mixed tocopherols daily combined with small doses of analeptic drugs for their synergistic effect.

In 65 manic depressive, depressive cases with severe depressive manifestations the results were similar to that observed in the involutional group. In 6 cases recovery was hastened by the mixed tocopherol therapy when it was added to the multivitamin medication these patients were already receiving and complemented on occasion by dexedrine or amphetamine. The recovery was gradual and results were not as specific as that observed following electroshock therapy. It is my impression, however, that in the cases receiving tocopherol medication, 2-7 electroshock treatments were usually sufficient to bring forth recovery, and only 3 patients required a greater number of treatments. Also patients who were receiving the tocopherols for several weeks prior to electoshock therapy seemed to tolerate the treatments better in spite of advanced age, cardiac and other complications. I have used it therefore routinely in all these cases for several weeks before and after electroshock therapy, with gradual reduction in tocopherol intake after improvement has taken place.

No beneficial effects were observed from mixed tocopherols administration on the psychoses of institutionalized schizophrenic patients when administered in doses of 100 mg. 3 times daily for a period of 6 weeks nor in the manic depressive, manic patients and it is my impression that it probably helped increase the psychomotor activity in two patients.

In the arteriosclerotic senile group of patients when combined with small doses of iodides such as Lugol's solution, 3 drops 3 times daily, and with attention paid to their

general nutritional status, improvement in the sense of well-being, reduction of irritability and gain in alertness was observed. The average dose was 50 mg. daily of natural mixed tocopherols. I have used it routinely in this group of patients.

I have found the tocopherols of definite value as an adjunct in treatment of cases of psychomotor epilepsy when used in combination with anticonvulsant therapy. Reduction of anticonvulsant drugs required became possible, especially in the female patient whose attacks were perimenstrual in incidence. It also brought partial or full relief of premenstrual tension and mazodynia in 50 percent of cases, although it had little effect in relieving premenstrual backache.

A number of patients with recurrent headaches, migraine-like in character, have reported a decrease in frequency of headaches after a month or longer of tocopherol therapy. These patients have received the usual coal tar analgesics besides codeine, also gynergen and cafergone, and estrogenic medication without obtaining complete relief. While it did not always abolish the headaches completely, the comment was that the headaches were less disabling and could be controlled by coal tar analgesics whereas prior to tocopherol therapy bed rest for the duration of the headache was required.

I have found tocopherol therapy of greatest value in the large group of patients usually diagnosed as psychoneurosis, neurasthenic type, or hypochondriasis, or conversion reaction and whose outstanding symptoms are fatigue, impairment of concentration, lack of enthusiasm, vague body discomforts or more localized body pains, combined with considerable anxiety and mild depressive features. Such patients while they constitute a large percentage of the average psychiatrist's practice respond slowly to psychotherapy as the discomfort in many instances has a real basis and is not entirely of psychogenic origin as it is often assumed to be. These patients are usually treated by means of prolonged psychotherapy when available, analeptic drugs, sedation, reassurance and elimination of contributing psychogenic factors. The psychiatrist's success is not always greater than that of the general practitioner who often had such patients under his care for months or years and treated them with sedatives, vitamin B-1 injections, or parenteral estrogens, if the patient showed the slightest evidence of menstrual irregularity between the ages of twenty-five and sixty. I found that the addition of 50-100 mg. of mixed tocopherols daily, together with other vitamins, the latter depending on patient's nutritional status, most effective in bringing forth gradual disappearance of postprandial distress, greater tolerance to emotional stress, and ability better to withstand fatigue following additional physical and emotional demands. I have frequently combined the tocopherols with 2.5-5 mg. dextroamphetamine or 5 mg. desoxyephedrine once or twice daily, for their synergistic effect, and ⅛-¼ grains of sodium amytal several times daily. A free and open discussion of the psychiatric problems involved was carried out during each interview, but it frequently became apparent that with the improvement in the patient's sense of well-being and return of zest for living, many of the previously vexing and intolerably distressing endogenous and environmental irritants would lose their sting. The advantage of the tocopherols over other analeptic drugs is that the improvement is longer lasting and does not depend on daily administration for a sustained effect. Discontinuation of the medication does not produce the immediate letdown and feeling of depression frequently complained of by many patients on amphetamine or desoxyephedrine medication.

I have also administered routinely 50-100 mg. of mixed tocopherols daily to all cases of alcoholism after several alcoholic patients have commented on the relief from gastric distress and improvement in digestion which they experienced while they received the tocopherol supplements. Similar relief from distressing postprandial gastric symptoms were reported by patients who have been treated in the past by their family physician supposedly for gastric ulcers. Jensen[21] has also observed the development of gastric ulcers in 67 per cent of rats on a vitamin A deficient diet, and reduction of incidence of ulcers to zero when mixed tocopherols were

added to the rations. The addition of alcohol to the feedings was also found by Jensen[21] to render the tocopherols less effective so that 10 per cent of the animals did develop ulcers. These findings would tend to confirm the prophylactic and therapeutic value of tocopherols administered for deficiency ulcers or other gastric symptoms, and suggest that alcoholics probably require larger amounts of fat soluble vitamins than the non-alcoholic individual for maintenance of the integrity of the gastric mucosa.

Discussion

When one considers the large variety of pathologic conditions reported to have improved following vitamin E therapy, wishful thinking on the part of the attending physician must be definitely considered as a possible explanation for this therapeutic optimism. Before, however, such an assumption can be accepted as valid, an analysis of the role of tocopherols in the metabolism of various body tissues might help explain the apparent widespread response to its administration. The tocopherols are found in every organ of the body with the greatest concentration in fat tissue, pancreas, liver, testes, and muscle fibres. One of its main functions is that of antioxidant and probably as chemical regulator of oxygen consumption in the body. Prevention of excessive oxidation, or development of rancidity in fats, in vitro as well as in vivo, is also one of the properties of tocopherols. Another function is to bridge the gap between proteins and fat, and in animals on a starvation diet it has been found to prevent too rapid breakdown of tissue proteins, and thus it would tend to prolong the life of an animal exposed to an inadequate diet.[22] One can assume, therefore, that the tocopherols are just as closely related to protein and amino acid metabolism as they are with fat utilization, with a different enzymatic system or trace elements probably involved.

The place of the tocopherols in the regulation of oxygen consumption is best exemplified in the reduction of excessive muscle oxygen uptake which is found in dystrophic muscles of experimental animals on an E deficient diet. This increase of oxygen use is not due to improved function but to faulty utilization. Following the addition of tocopherls oxygen uptake returns to normal with concomitant increase in muscle power.[23] Experimental animals exposed to rarefied air simulating high altitude conditions on high tocopherol intake were able to withstand conditions fatal to controls.[24] Similar observations have also been made in animals exposed to carbon tetrachloride fumes.[25]

Vitamin E also acts in a synergistic manner with other vitamins. When added to fat soluble vitamin A it was found to further augment growth, produce additional gain in weight and increase the amout of vitamin A stored in liver.[26] When combined with selected vitamin B complex factors it affords extra protection against demyelinization and the breakdown of lipoid lining of nerve fibers. Together with vitamin C it is required for the maintenance of the integrity of the vascular system and collagen matrix. It also acts most likely as a precursor of ACTH or cortisone, and some of its effects can probably be best explained on this basis. In animal experiments the tocopherols have been found to produce somewhat analogous results to that produced by cortisone or ACTH. I[12] have previously reported on its value in atrophic arthritis, Steinberg[13] has found it of value in fibrositis and Burgess[9] in lupus erythematosus, all conditions in which there is a demonstrable impairment of collagen metabolism. The improvement in the sense of well-being reported by many of the patients receiving tocopherols is somewhat similar to that seen following cortisone or ACTH administration. The reason for the less specific affect of vitamin E lies in the fact that certain other substances, either enzymes, vitamins, halogens, trace elements, or selected amino acids are required for the proper utilization of the tocopherols by individual body tissues. If such substances are not available in proper amounts failure of response to tocopherol therapy will result. This would explain the negative results from tocopherol therapy observed in some animals in contrast to others even when saturation levels are reached. The animal may have all the tocopherols it needs but still not be able to utilize it. Faulty utilization of vitamin E may be much more common than suspected and till all the va-

rious factors are recognized and supplied when needed, discrepancies in reported results from vitamin E administration will be common.

Whether the improvement in state of well-being observed in patients receiving tocopherol medication is due to indirect stimulation of anterior pituitary or adrenal cortex or is the direct result of production of more efficient oxygen utilization in the body by the tocopherols, their sparing action on proteins, and better utilization of cholesterol and fats is problematical at this time. It is probable, however, that this improvement in state of general well-being reported by patients receiving tocopherols that accounts for the very optimistic reports in the literature on the use of vitamin E in the treatment of heart disease. The possibility that many of these cases represent cardiac neuroses might also be the explanation, since cases with demonstrable coronary involvement, according to later and more comprehensive studies[27] have failed to show the physical nor the electrocardiographic improvement expected.

Summary and Conclusions

Vitamin E in the form of natural mixed tocopherols has been administered to over 2800 patients with various neuropsychiatric disorders in doses of 50-100 mg. daily, alone or in combination with other vitamins. It was found to be of greatest value in patients with anxiety or conversion reactions with mild depressive symptoms and somatic components, including fatigue, anhedonia and postgrandial distress. Its effects were similar to that of the analeptic drugs except that the results were more permanent and patient did not become dependent on the medication.

Severe involutional depressive states and severe manic depressive, depressive reactions failed to respond to prolonged tocopherol therapy. Most of these cases required electroshock therapy to bring definite relief. In involutional neuroses and in mild depressive reactions it was found of value in making the symptoms less distressing when combined with small doses of estrogens, analeptic or sedative drugs and was of definite value in hastening recovery.

In the arteriosclerotic, senile group of patients when combined with other vitamins and small doses of iodides in the form of Lugol's solution, it produced improvement in the sense of well-being, better social adjustment and increase in mental alertness. It would be advisable to administer it routinely in all such cases. Alcoholic patients with gastric disturbances and complaints of emotional and physical letdown have reported relief of gastric symptoms and increase in energy following administration of 100 mg. of tocopherols daily together with other vitamins.

Reduction in severity and frequency of attacks when combined with anticonvulsant therapy was observed in cases of psychomotor epilepsy receiving mixed tocopherols. Decrease in incidence of migraine headaches and severity of perimenstrual tension states and mazodynia was observed in 50% of patients with such symptoms receiving tocopherols for other conditions.

Due to the analogous effects on the collagen system diseases of the body and the similar improvement in the sense of well-being reported by patients receiving the tocopherols, ACTH, or cortisone, the possibility that the tocopherols are precursors of the latter substances is conjectured, with the utilization of the tocopherols and their transmutation probably depending on the presence in the body of selected enzymes, trace elements, amino acids or halogens.

Further investigation as to the place of tocopherols in the treatment of various psychiatric disorders especially with regard to their utilization in the body and the most efficacious method of administration would be most desirable.

Author's Note: The mixed tocopherols used in this investigation included Tofaxin capsules supplied by Winthrop Chemical Co.; Eprolin capsules supplied by Eli Lilly & Co.; and Natural Mixed Tocopherols capsules supplied by Distillation Products, Rochester, New York.

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Intracerebral Vascular Pseudocalcification Associated With Schizophrenia

(Report of a Fatal Case)

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Increasing attention has been redirected recently to the relationship of organic brain disease processes to the psychoses. Ferraro and co-workers[1] stated that lesions of the brain may sensitize a patient to psychiatric illness. Penfield[2] has postulated that a cortical control and reality testing center may exist in the deep gray matter of the brain. It is our purpose to present a case in which pseudocalcific degeneration of the small vessels in the deep nuclear masses of the brain, principally in the corpus striatum and cerebellum, was associated with protracted schizophrenic symptoms as well as epileptiform seizures and terminal neurological signs with decerebrate rigidity and coma.

Report of Case

The patient, a Mexican woman, twenty-seven years of age, was first admitted to the Colorado Psychopathic Hospital because she was becoming increasingly irritable, negativistic, and was hallucinating. The diagnosis of schizophrenic reaction was made. Her parents related that she was born in Mexico and was brought to the United States when fourteen years old. Her school and social adjustment had been adequate until the last few years prior to her hospitalization. At the age of twenty-three the initial symptoms appeared; they were increasing withdrawal and bizarre mannerisms. One year later she began to have grand mal convulsions, which occurred once or twice a month and were partially controlled by dilantin. Her behavior immediately before her entry into the hospital had shown considerable deterioration. She was irritable, angry, extremely suspicious, distant, negativistic, and resistive. She described vivid hallucinations in which she saw the Devil and the Virgin Mary. These symptoms abated after one week of hospitalization and she grew cooperative, friendly, and congenial although at times she was indifferent, apathetic, and somewhat dissociated. The neurological and physical examinations disclosed no abnormalities. The laboratory examination showed a positive blood Wassermann test. The spinal fluid chemistry was normal and the Wassermann test was negative. An electroencephalogram demonstrated a severe diffuse cerebral disturbance. Skull X-ray films revealed no pathological changes. The patient's mental status improved sufficiently to permit her release to her parents on the thirty-eighth hospital day.

Following her discharge she received adequate antiluetic therapy as an out patient. She gradually became withdrawn and was returned to the hospital one year later. The clinical findings were the same as those described during the previous hospital stay. The blood Wassermann test remained positive, but all other laboratory tests were within normal limits. Considerable clinical improvement occurred and she was discharged on the twentieth hospital day.

Six months later she was admitted for the last time. It was noted that she walked with a shuffling gait and that her left arm and leg were extended and spastic even when she was in a sitting position. She was in fair contact and was cooperative. Occasional grand mal convulsions were observed. She soon lapsed into a semicomatose state during which all of her extremities were rigid and she failed to respond to external stimuli. This episode lasted for several hours and was followed by an interval in which she could communicate freely and walk about the ward. A neurological examination in the recovery period revealed an increase in the deep reflexes of the left side of the body with a concomitant increase in muscle tone. The plantar responses were abnormal bilaterally. Nystagmus was observed with the

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quick component to the right. The blood Wassermann was again positive. Blood counts, urinalyses, and spinal fluid examinations were within normal limits. On the eighth hospital day the patient lapsed into a deep coma from which she could not be roused. Her extremities were markedly spastic, and the deep reflexes could no longer be elicited; she remained in a constant state of rigidity of the decerebrate type. On the eleventh day of hospitalization the patient's respirations became irregular, her temperature rapidly increased to 107° F, and she died showing the clinical picture of respiratory failure.

Pathological Examination: The post mortem examination was performed eleven hours after death. The body was that of a nomally developed and well-nourished Mexican woman thirty years of age, and it measured 158 cm. long and weighed 45 kg. The lungs showed hyperemia and edema; minute patches of bronchopneumonia were scattered throughout the right lung. Additional diagnoses were chronic bilateral salpingitis, unilateral hydrosalpinx, and fibrous perihepatic peritoneal adhesion. The cardiovascular system was normal. The thyroid gland appeared normal, weighing 18 gm.

Gross Examination of the Brain: The inspection of the brain, which weighed 1170 gm. after embalming, gave no hint of the extensive microscopic changes. The leptomeninges were thin and translucent. The walls of the cerebral blood vessels were thin and the intima was smooth. The gyri of the cerebral cortex were fully developed but slightly flattened. The central white matter of the cerebrum, which bordered the corpus callosum, felt slightly firmer than normal. Many delicate red vascular streaks and puncta were present in the caudate nuclei and in the neighborhood of the dentate nuclei. Nowhere was there evidence of calcification and the knife encountered no resistance in sectioning.

Microscopic Examination of the Brain: There was widespread apparent calcification of the capillaries and arterioles, principally in the corpus striatum and the cerebellum. The capillatry network was easily visualized because of the deposition of dark blue spherical bodies within the capillary endothelium and on the outer surface of the capillary walls. They adhered to the vessel walls or overlaid the endothelium without conforming to the shape of the endothelial cells. These globules were smoothly contoured; they stained intensely blue-black and homogeneous in the sections treated with the hematoxylineosin stain; and they varied from the size of minute granules to the diameter of lymphocytic nuclei. In Nissl preparations they were light blue with sharp borders and the larger ones exhibited pale concentric rings. A small portion of them lay free in the parenchyma. In most places the globules were confluent and formed knobby masses. The caudate nuclei and the medial portions of the putamens showed the heaviest involvement and here occasional capillary lumens were obstructed or obliterated but most of them were patent. Cross sections of some capillaries showed a complete ring of fused globules encircling an empty lumen. In one patchy area the blue material formed heavy twig-like masses, which resembled the calcifications seen in Sturge-Weber disease.

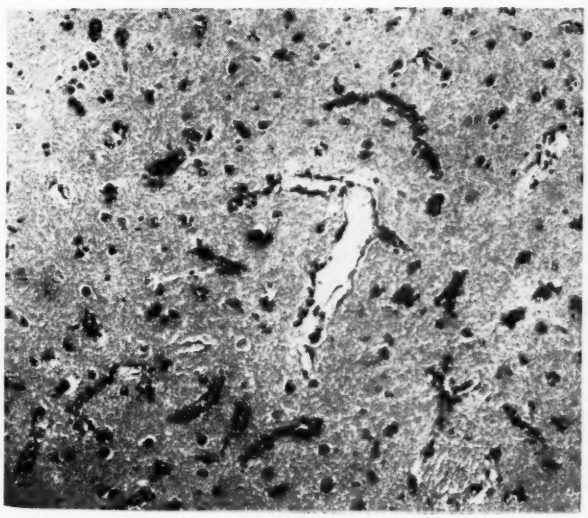

Fig. 1. "Calcified" capillaries in the putamen. Hematoxylin-eosin. X150.

The arterioles showed a somewhat different pattern of "calcification." Either the media, the adventitia, or both were diffusely impregnated with the basophilic substance and discrete spherules were seldom apparent. In some of the arterioles separate fine blue granules were scattered through the entire media. More commonly amorphous masses of material, which had a tendency

to fragment, formed solid plates and sheaths in the wall. Elastic fibers were calcified in some areas and the smooth muscle cells were spared while in other places the entire muscular coat was replaced. The adventitia was less extensively affected than the media although this layer alone occasionally contained blue masses of fibers in the peripheral portion. In one instance the arteriolar wall was solidly thickened to four or five times the normal width. The intima of most of the arterioles was thin; however, a proliferation of loose intimal connective tissue fibers occasionally almost obliterated the lumen.

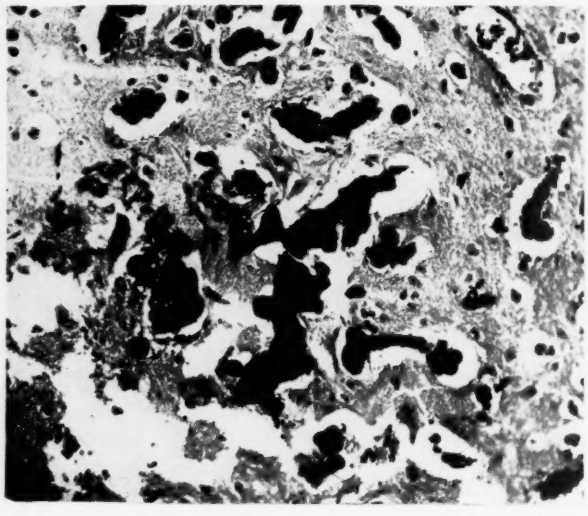

Fig. 2. Heavy deposition of the material in the globus pallidus.

The small veins of the caudate nucleus and the cerebellum were greatly dilated or congested. The intima and the media were normal but the adventitia was thickened and contained rare blue spherules. In many of the venules there was a moderate to heavy infiltration of the adventitia, and occasionally the media, by lymphocytes and a few hemosiderin-bearing macrophages. The severely dilated Virchow-Robin spaces sometimes contained small hemorrhages.

In the cerebellum the capillary network of the right dentate nucleus and the granular layer of the nearby cortex were severely affected. The molecular layer of the cortex showed minimal involvement and the Purkinje cells in the area of densest "calcification" were normal. The arterioles and venules of the central white matter of the cerebellum also showed extensive involvement.

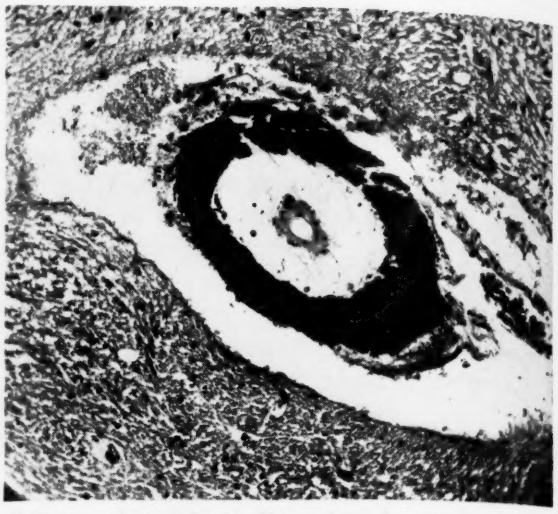

Fig. 3. Arteriole in the internal capsule showing fibriotic intima and fragmented "calcified" wall. Hematoxylin-eosin. X150.

The leptomeninges of the cerebellum contained focal infiltration of lymphocytes, unike the meninges of the cerebrum.

The thalamus was only slightly affected. The substantia nigra, the red nucleus, and the mammillary body appeared normal. The internal capsule, particularly on the right side, the corpus callosum, and the deep white matter of the parietal lobes of the cerebrum showed "calcification" of moderate numbers of the arterioles. The Spielmeyer stain and Scharlach-R stain revealed no degeneration of the myelin. A small patch of the parietal lobe cortex showed "calcification" of the capillary network in the third, fourth, and fifth layer. A similar focus of capillary degeneration was present in the white matter in the convexity of Ammon's horn; the nerve cells of Sommer's section were normal. "Calcification" was not observed in the pons and medulla but the venules were congested and the walls of several in the restiform body and the inferior olivary nuclei were infiltrated by moderate numbers of lymphocytes.

The degeneration bodies were almost always present in close relation to the blood vessels and were never seen in or about nerve cells. With the routine stains the appearance of the vessels suggested that the process was one of calcification. The Kossa stain for calcium was negative; the potassium ferricyanide stain showed the presence of iron in many of the spherules. The calcium content of the brain tissue taken from

the affected areas and dried to constant weight was normal.

The number of nerve cells in the caudate nucleus and putamen was reduced slightly and both the small and large cells were equally affected. Many of the cells were pae and inconspicuous or their cytoplasm was eosinophilic. There was also a moderate proliferation of large protoplasmic astrocytes in these areas; however, there was no shrinkage of the parenchyma or glial fiber reaction. The nerve cells of the dentate nucleus showed a moderate reduction in number. Many evenly scattered nerve cells throughout the cerebral cortex were pale, shrunken, or ghost-like, and there were a few rod cells present. These changes were recent and apparently unrelated to the capillary degeneration as the nerve cells in the focus of cortical capillary "calcification" were exactly like those in the other areas. In the reticular substance of the medulla the nerve cells showed acute changes; swelling, paling, disruption of the cytoplasm, and fragmentation of the nuclear chromatin. In this region there was also a slight glial proliferation and very slight infiltration of the parenchyma by polymorphonuclear leucocytes.

Discussion

The type of non-arteriosclerotic vascular change present in this patient was termed "pseudocalcification" by Spatz[3] and has been described in association with a variety of diseases. Hurst[4] found it, involving the globus pallidus mainly, in paralysis agitans, epidemic encephalitis, cerebrovascular disease, syphilis, disseminated sclerosis, intracranial neoplasms, and other conditions. He invariably detected iron in the"degeneration bodies" but was unable to prove the presence of calcium. In our experience, small areas of pseudocalcification, especially in the globus pallidus are so frequent and apparently unrelated to the principal disease that their pathologic significance should not be overrated. Camp[5] pointed out the frequent association of this condition with hypoparathyroidism and tetany and he emphasized the possibility of detecting the calcified masses in the basal ganglia by X-ray examination. Chavany and collaborators[6] described a case of pseudocalcification in a man of forty-six who presented severe psychoneurotic symptoms, extra-pyramidal signs, and death due to pulmonary edema. Strassmann[7] found calcium and iron deposits in a large number of brains of patients with various mental diseases. Volland[8] described similar cases showing epilepsy and mental deficiency; the symptoms of one patient developed after an attack of scarlatina. The distribution of lesions in the basal ganglia, dentate nucleus, and cerebral cortex also was similar; however, the process had proceeded to the stage of frank calcification and the formation of large "brainstones." Other cases of obvious calcification have been reported by Bassoe and Hassin[9] and Rand, Olsen, and Courville.[10]

The cause of the vascular disturbance in this case is unknown. The absence of cerebral endarteritis excluded syphilis. A post-encephalitic state appeared unlikely because of the lack of a history of acute symptoms and the lack of parenchymatous changes in the substantia nigra. Hypoparathyroidism was not considered and blood calcium studies were not made because of the absence of tetany.[11]

The relative triviality of the nerve cell alterations in the areas of vascular involvement suggests that the deposition of this material did not result secondarily from antecedent necrosis of the brain parenchyma. We believe that the symptoms were best accounted for on the basis of a transient recurrent vasomotor disturbance, and that the histological changes were only an indication of an underlying, profound, ultimately fatal physiological malfunction. Had the patient survived, calcium might well have been deposited in the substance which has been considered to be a transudate of colloid (Meyer).[12] As Altschul[13] stated, the colloid may not be specific for any one disease, but is analogous to hyalin or amyloid.

The relation of the clinical symptoms to the brain lesions is obscure. This patient's increasing difficulty in making a social adjustment and her complete withdrawal, which alternated with episodes of violent and bizarre behavior, antedated the onset of her neurological symptoms by several years. The early onset of mental symptoms with temporary absence of signs of involvement

of the sensorimotor systems has been reported in other organic brain syndromes. Ferraro[1] has described several schizophrenic reactions associated with brain damage in which neurological findings were negligible or late. Mental symptoms concomitant with organic brain disease are usually regarded as a non-specific response of the individual to physiological impairment. Schilder[14] has pointed out that psychopathological manifestations often become more apparent when an individual develops brain lesions. This patient's behavior might be described as a mechanism whereby she attempted to maintain her total personality economy in the face of a conscious or unconscious awareness of increasing inadequacy.

The wide variation in psychic symptoms seen in specific brain diseases has led many authors to doubt that there is a more exact relationship between the type of lesion and the resulting symptoms. These psychic changes seem to be related to the site rather than to the type of the organic lesion. Specific personality changes following selective frontal leucotomy have been reported by Halstead.[15] Bailey and others have produced experimental lesions in the brain stem of the cat which caused specific reproducible behavior disorders. Penfield[2] has recently postulated that "there is within the nervous system an area of gray matter which is particularly related to the processes of understanding, deciding, and remembering (reality testing centers), which may be paralyzed without arresting an elaborate system of coordination between sensation and motor control." On the basis of his study of epilepsy, he believes these faculties are a function of a cortical control center located deeply in the brain. The disturbance in the corpus striatum of this patient might well have involved such a "supracortical" center, and have accounted for her inability to differentiate fantasy from reality. Undoubtedly a close relationship existed between the cerebral pathology and the psychic manifestations of this patient. The presence of degenerative changes in strategic areas rendered her vulnerable to psychogenic problems and impaired her ability to handle them. However, the specific psychodynamic mechanisms operating in this patient were dependent in part on her earlier life experiences.

Summary

A case is presented in which advanced pseudocalcific vascular disease with minimal parenchymal damage involved the extrapyramidal system and was associated with protracted schizophrenic symptoms and late neurological changes. Physiological and pathological alterations in strategic areas of the brain apparently were related closely to the patient's vulnerability to psychic illness.

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Convulsive Effects of Electroencephalostimulation By Manually Controlled "BST"

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It has been established[1] that motor phenomena associated with electroencephalostimulation may be modified by control of the 60 cycle sine-wave—alternating—current without changing the wave form. Sine-wave stimulation especially with a frequency as low as 60 cycle involves much wastage of non-participatory electric power which nevertheless may generate heat which has been thought[2] to imply fibre damage.

This author's attitude[3] toward therapy in the neuropsychiatric field is distinctly catholic as well as conservative. Whether or not the dynamics of electroshock are cenesthetically facilitative or post-traumatically metergasic is not here under consideration. A moot point often can be settled only by diversiform approach; it is hoped that these data serve in a small way to embellish another component in future investigation along the above lines.

It is thought by many[2,4,5,6] that the most desirable wave-form for use in electroencephalostimulation is that which is apt to cause least tissue damage. The ideal wave-form, a linearly rising current with an internal resistance-arrest mechanism—so that the form and power of the stimulus are unmodified by factors that momentarily alter the resistance of the skin—appears at present electronically impractical as a clinical tool. "Square" waves are readily available and appear to be, under the considerations mentioned above, the wave-form of choice.[2,4,5,7,8] The conventional use of the bitemporal positioning of electrodes with the slow-rise or "glissando" affect, has been clinically introduced[9] in BST electroencephalostimulation. Early workers[6] in unidirectional "square" wave-form stimulation now concede the possibility that there is room for its application at a higher energy rate—but at a rate still appreciably below the energy rate common to the classical 60 cycle sine wave-form. The author[9] has worked out calibrations appropriate to a bitemporal positioning of electrodes in "glissando" BST —Liberson No. 3 Wave-form.[7]

Since a recognized advantage of BST is its ability to utilize the minimum threshold convulsive energy[2,8] and at the same time permit a relatively large and safe margin of energy increase when particular need appears indicated, this author interested himself in the application of Liberson's wave-form, No. 3 to the principles emphasized by Tietz, Olsen, and Rosanoff,[1] and others.[10] The extension of BST utility to this and allied fields was recommended by Liberson[11] at least five years ago along with other items of major import to electric shock therapy.

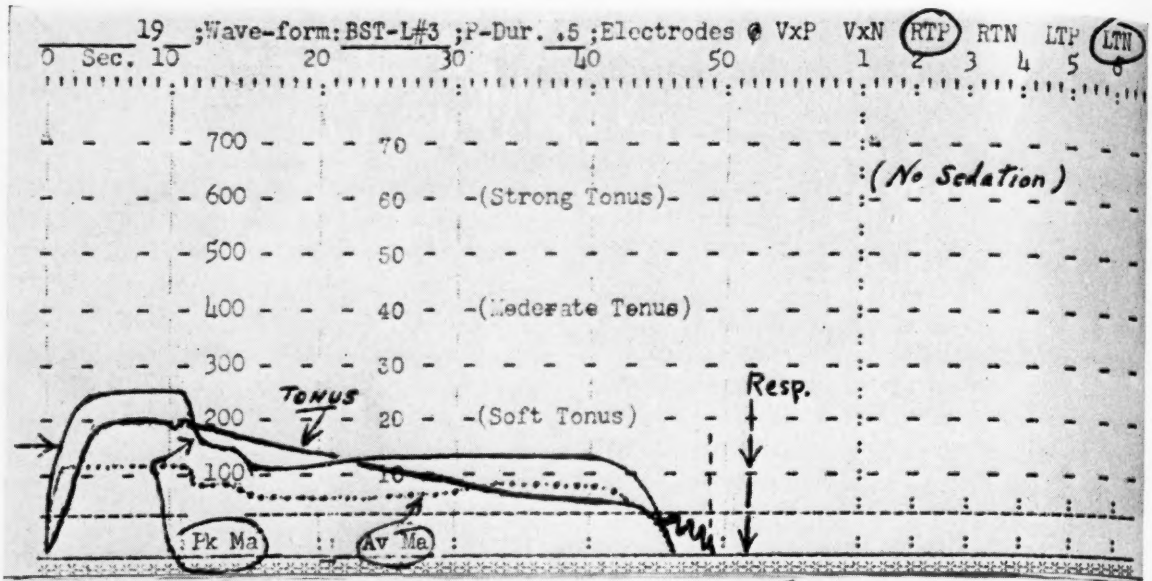
By commensurate reckoning and clinical confirmation, effects roughly paralleling those reported by users of 60 cycle sine-wave stimulation have been obtained. With the right-temporal-positive, left-temporal-negative positioning of electrodes, the apparatus is preset at from 150 to 350 m.a.—pulse duration 0.5 millisecond—and after the automatic initial "glissando" interval, the current is manually raised to and maintained at between 250 to 500 peak m.a., until the "extensor stretch"[1] establishes the onset of a *grand mal* seizure. Thereafter the current is reduced to a level between 50 m.a. and 200 m.a. which adequately minimizes or eliminates the clonic movements until their spontaneous termination; after which the stimulation is stopped either by moving the current control to "zero" position or by throwing off the treatment switch. The pulse duration may be increased to .7 or to 1.0 millisecond if post treatment amnesia is desired.

A graphic record of a typical application of the above is shown in Figure 1.

From Active Treatment Service, Women's Division, Oregon State Hospital, Salem, Oregon.

ELECTROENCEPHALOSTIMULATION THERAPY RECORD (INDIVIDUAL)
(A NORMOKINETIC 16 YEAR OLD FEMALE)

Fig. 1.



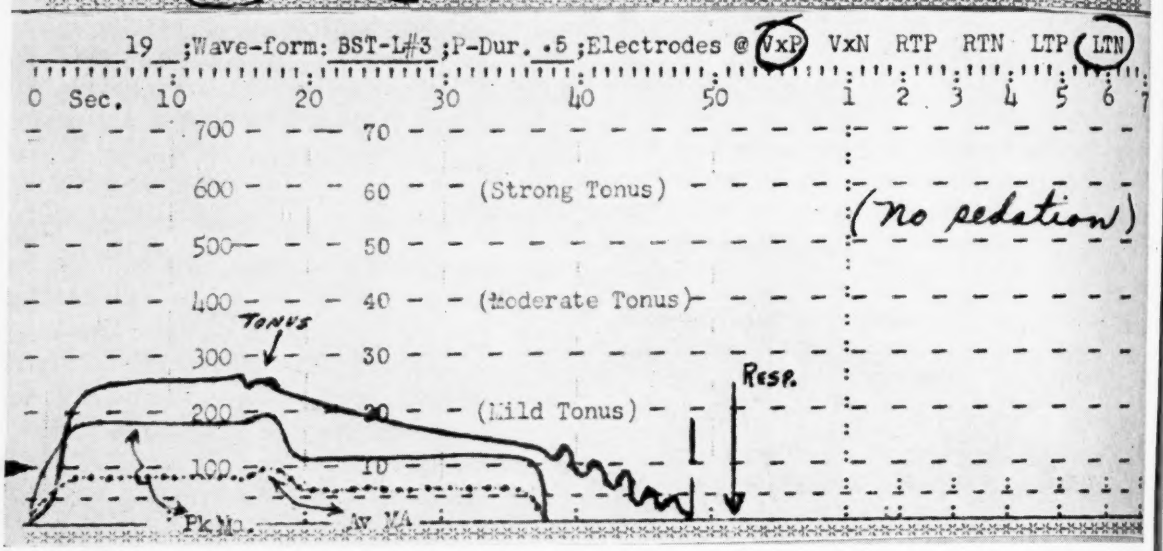


Fig. 2.

ELECTROENCEPHALOSTIMULATION THERAPY RECORD (INDIVIDUAL)
(A NORMOKINETIC 16 YEAR OLD FEMALE)

With vertex-positive, left-temporal-negative positioning of electrodes, lower current values similarly managed produce like effect: the apparatus is present from 100 to 150 initial glissando with pulse duration as above, and after such glissando is estimated as accomplished, the current is manually altered to between 150 m.a. and 300 m.a. to bring about the described[1] motor phenomena of roughly constant expectancy. It apparently requires relatively more current in the vertex-left temporal positioning to control the scope of the convulsion. Post treatment confusion is minimal.

A graphic record of a typical application of the above is shown in Figure 2.

Summary

The characteristics of BST[7] electroencephalostimulation as automatically and manually applied toward suppression of the motor phenomena in electroshock are described, and calibrative current-strengths are set down which may be expected to accomplish such modification.

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The Concept of Psychopathic Personality

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Prichard in England in 1835 was the first to attract the attention of the medical world to a condition he termed "moral insanity" or "moral imbecility" and which he described as follows: "There is a form of mental derangement in which the intellectual functions appear to have sustained little or no injury, while the disorder is manifested principally or alone in the state of the feelings, temper and habits. In cases of this nature the moral or active principles of the mind are strangely perverted or depraved; the power of self-government is lost or greatly impaired and the individual is found to be incapable, not of talking or reasoning upon any subject proposed to him, but of conducting himself with decency and propriety in the business of life."

In the latter part of the nineteenth century, Kraft-Ebbing in Germany, Bianchi and Tanzi in Italy described cases seldom treated in hospitals, but who are characterized by complete insensibility and absence of moral judgment and ethical notions. Koch in 1888 introduced the concept of constitutional psychopathic inferiority, including hysteria and obsessions in this entity. Kraepelin described constitutional psychopathic state and psychopathic personality. In the former he included sex deviates, psychasthenics, nervous and despondent individuals. In the latter group he included cases described by Prichard, "born" criminals, morbid liars and swindlers. Kraepelin hinted a possible relationship of psychopathy to psychoneurosis and psychosis.

In spite of the many papers and books written on the psychopathic personality, the definition and the psychopathological concepts vary with the authors and, therefore, the diagnosis of psychopathic personality is still considered a wastebasket of psychiatry. Some of the authors are mentioned here because their concepts have become classical.

Eugene Kahn in 1931 defined psychopathic personality as a descriptive term indicating inadequate social functioning which is a result of quantitative changes of impulse, temperament and character. According to Kahn, personality is determined by the three above-mentioned functions. Under impulse he understands conative forces which are genetically determined; temperament is composed of affect and mood, which also are

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genetically determined; character is comprised of striving toward a goal, attitude toward oneself and people, and it is socially determined.

Noyes defines the psychopathic personality as "various inadequacies and deviations in the personality structure of individuals who are neither psychotic nor feebleminded, the defect existing primarily in the conative, emotional and characterological aspect of the personality. In spite of deviations there is no loss of synthesis of personality like in psychosis."

Patridge defines psychopathy as lack of socialization and he prefers the term "sociopathy" to psychopathic personality. He emphasizes that there are various degrees of sociopathy and qualitative differences which shade over into the normal.

Cleckley in his book "Mask of Sanity" describes the psychopathic personality as an individual devoid of human emotions, as a "robot of indescribable ingenuity, who is able to do everything that a whole and healthy personality can do except participate in life on a personality level." He compares the psychopathic personality to a "psychobiologic machine, a machine that appears to be a whole personality but actually is moved by something very different." The action and emotions of a psychopathic personality are mechanical and devoid of depth.

Henderson has an all embracing concept of psychopathy. According to him, the psychopathic state is characterized by instability, queerness, explosiveness, intuitiveness and egocentricity. He includes in this category men of genius and people like Joan of Arc and Colonel Lawrence.

The psycho-analytic school itself has not formed a concept acceptable to all the psychoanalysts. Thus Ben Karpman feels that most of the patients diagnosed as psychopathic personality are in reality neurotics or schizophrenics. A true psychopathic personality is, according to Karpman, a constitutional state, characterized by inability to form ethical standards or super-ego. He claims that after years of analysis, no psychogenic source for the condition can be found. He prefers the term "anethopathy" to psychopathy and he uses the term anethopath in describing what he calls a true psychopathic personality. Lindner in his book "Rebel Without a Cause," asserts that psychopathy is a disorder of behavior which affects the relationship of the individual to his social setting. The conflict with society results from psychosexual immaturity, for the psychopath never develops beyond the pregenital stage, and therefore, perseverance, planning, gradualness are impossible. In his own case, having gone through hypnoanalysis, Lindner claims to have found memory of a primal scene he had witnessed at the age of 6 months, which he considers a traumatic event.

Fenichel stresses that psychopathic personalities are unable to direct their actions toward a positive aim of achieving a goal. Their actions are directed toward the negative aim of getting rid of tension. A psychopath is like an infant who has not learned to coordinate purposeful movements nor to postpone immediate desires. Like in an infant, tension is felt as a threat to existence and has to be relieved without postponement. For this reason he calls psychopathy impulse neurosis. Some psychiatrists question the very existence of psychopathy and they believe that psychopathic reactions are usually a manifestation of either schizophrenia or psychoneurosis. All functional psychiatric disorders can be reduced to a form of reaction to anxiety. Therefore, if one followed the logic of these psychiatrists, he would classify all non-organic reaction types as anxiety state. Our diagnostic criteria are based more on symptomatology than on dynamics, and, therefore, certain types of immature, asocial individuals should be placed in a separate category. It is admitted that this category is ill-defined, that it merges on the one side with schizophrenia and psychoneurosis and with simple immaturity and egocentricity on the other side; that psychopathy is essentially a sociopathy and that there are various degrees of psychopathy and quantitative differences between the so-called normal individuals and typical psychopaths. However, every sociopath cannot indiscriminately be classified as a psychopathic personality, for sociopathy is frequently an expression of psychoneurosis, early schizophrenia or criminality.

Although various personality disturbances may frequently be responsible for criminal behavior, it is very often determined by social environment and moral values and concepts conflicting with the established patterns. On the other hand, one should be careful of not missing a psychopath merely because of record of good conduct and adequate army service. We believe that emotional immaturity is the basic characteristic of a psychopath. This immaturity is manifested by egocentricity, impulsiveness, inability to form long range plans and to strive toward definite goals, inability to persevere in one's endeavors, inability to form deep feelings such as lasting friendships, love, or for that matter, lasting deep hatred. We agree with Fenichel that the psychopath, like an infant, is unable to handle tension in a realistic way and that he is forced to release it without delay. Hence his inability to conform to the reality principle, his impulsiveness, and frequently his moodiness and his escape mechanisms such as malingering, alcoholism, drug addiction, at times hysterical manifestations and psychotic breakdowns.

The ethical standards or super-ego of the psychopath was the first to attract the attention of the early observers. Certainly the super-ego of the psychopath is weak. This, however, is not a primary inborn and constitutional characteristic as suggested by Ben Karpman, rather it is a result of emotional immaturity. In our opinion psychopaths without any trace of super-ego are extremely rare. What we feel is true, is that their ethical feelings are superficial, as superficial as their total affectivity. They may rejoice or grieve with somebody, but this will not be lasting. They may feel indignant over unethical acts, but this indignation will lack depth of feeling. This superficiality of emotional life gives us an impression of a "psychobiologic machine that appears to be a whole personality, but actually is moved by something very different," as expressed by Cleckley. It is not surprising that the behavior of this type of individual is frequently but not necessarily sociopathic. Another common manifestation of a psychopath's immaturity is his tendency to histrionics, to show off, to be in the limelight. Often psychopaths will make unsuccessful suicide attempts in certain situations in order to attract attention, just another way to be in the limelight or to escape unpleasant, tension producing situations.

Is it possible for a psychopath to have neurotic and psychosomatic manifestations? Certainly, it is possible and many of them show manifestations of anxiety. There is no reason why the same individual should not have neurotic and psychopathic traits combined, although some psychiatrists feel that psychopaths "act out" their conflicts, whereas neurotics "act in" their conflicts.

Sexual deviates, alcoholics and drug addicts are frequently classified as psychopaths. True, many psychopaths may be homosexuals, or they may revert to alcohol and drugs to relieve their tension. However, based on our experience we believe that the majority of true homosexuals prefer to practice fellatio and to play the female part in their relationship with the male (we speak about male homosexuals); the partner is usually an aggressive psychopath who indulges in heterosexual as well as in homosexual relations, always playing the male role. A great number of aggressive and unstable psychopaths we had the opportunity to examine revealed passive fellatio or active pederasty experience in their history. All, however, feel that they are not "queers," whom they treat with disrespect, and they never indulge in passive pederasty or active fellatio. Thus we feel that only those homosexuals or other sex deviates should be classified as psychopaths, who in addition to their deviations show immaturity traits described above. We know that many homosexuals make an excellent adjustment, show a great depth of feeling, are able to plan and to inhibit their many desires which a true psychopath cannot do.

As for etiology, the theories can be divided into constitutional, organic and psychological. Constitutional defect was stressed by older investigators. That is why psychopathic personality was called constitutional psychopathic inferiority or constitutional psychopathic state. The modern theories tend toward the psychological view stressing disturbed family environment in early

childhood. It is known that some cases of head injury, of Sydenhams's chorea and epidemic encephalitis are followed by sociopathic behavior and many observers including Nielsen feel that in many cases an organic basis can be found in psychopathic personalities. This view seems to be substantiated by several electroencephalographic studies where abnormal records were found in a large proportion of cases. However, Knott and Gottlieb found that abnormal EEG's are more frequent in psychopaths with a neurologically loaded family history and past personal history of head trauma or severe illness.

Summary

The historical background of the concept of psychopathic personality and the present day views were given. Although the very existence of this entity is denied by many psychiatrists it is felt that individuals whose basic symptomatology is manifested in the sphere of social relationship and whose basic psychopathology is manifested by immaturity reactions, should be classified as psychopathic personality. Most modern investigators support psychological theories of etiology of psychopathy. The older investigators believed that it was a constitutional disease and some modern investigators feel that in many cases it may have an organic background which seems to be substantiated to some extent by abnormal electroencephalographic records.

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Planning a Mental Hospital of Fifteen Hundred Beds

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Needs: In all parts of the United States additional accommodations are needed for the mentally ill. Many professional men and administrators are engaged in planning new buildings. Existing institutions are crowded—in some places perilously overcrowded. Proper treatment is seriously handicapped by this overcrowding. Many existing hospitals are to be enlarged, with greater or less wisdom. Here and there (as in Virginia) a new plant is to be erected. A question that should be settled early in the planning is the size of the prospective institution as expressed in the number of its beds for patients. A decision on this question affects not only the number and size of dormitory buildings but many other buildings too; the size of the heating plant, of the storehouse, of the recreation hall and even of the garage (through the number of vehicles in use) depends on the number of patients that will be cared for in the new hospital and the number of employees that will be engaged to do the many kinds of work that contribute to the activities of a hospital.

Size: Different minds inevitably have different ideals. Sometimes the ideal relates more to the individual's personal experience than to abstract logic, for what one is used to may seem to him much better than something he has not tried. Mental hospitals of different sizes have been widely discussed and now it is timely to formulate the characteristics of different types so that public authorities who are not versed in these matters can make an intelligent choice between different schemes. This document accordingly deals with the structure and personnel of a mental hospital of about 1,500 beds. Experience has shown that such an institution is not too costly to build, is economical in operation and encourages a degree of personal attention to the patients that is harder to assure in big institutions. The history and the treatment of every patient in an institution of this size can be occasionally reviewed by the physician who has the most experience and technical knowledge of all those in the organization—the executive head. This is by no means unreasonable; his salary and allowances never overshadow those of a leading physician in private practice, the kind of professional man that any intelligent family might expect to engage occasionally as a consultant.

Function: Accordingly the outline that follows is based on the idea that 1500 beds is a convenient and relatively comfortable size of institution for the patient whether he be in the throes of excitement, in a morass of depression or in an apathetic state. All groups need the best treatment that present-day knowledge can prescribe, and in a hospital of this size, the best should be available.

Layout: A site will be chosen embracing 800 to 1,200 acres. Much of the land will be tillable. The most attractive sites are on uneven ground, and advantage should be taken of every natural slope. An institution on such terrain can escape the look of a geometrical arrangement of equal little blocks; its group—or several groups—of buildings will rise from natural levels of the earth and in many instances will be veiled from each other by hillocks or by plantings of shade trees.

The hospital will consist of detached buildings connected by passageways at ground level or by tunnels. Most of the structures can be so placed that patients' buildings and connecting corridors enclose a large court or two. It is not very important whether there be one large court as at Newberry (Michigan) or two as at Northport (New York). These courts should not have straight rectangular outlines nor a forbidding appearance that stresses difficulty of escape. In them, many patients—especially elderly ones—may go about without let or hindrance; the few points of exit will be under observation by employees. Very restless patients and those whose conduct or language is disturbing to others may have their own, smaller exercise yards, but not so small that many feet wear off the grass and leave only dust. These smaller yards will be more easily supervised and will be on the periphery of the group of buildings rather than in its center.

Height: The largest number of buildings should be of one story. Not only in the mild climate of California but also on the gusty plains of Illinois has it been found economical to construct and operate considerable numbers of one-story buildings. Many functions are harder to carry out in a high building, functions ranging all the way from transportation of food, supplies, equipment, and visitors, down to window washing. The taller the building, the harder it is to get patients out of doors. The average age of our hospital population is rising and this means that there are more and more patients with impaired circulation. Though our hospital patients are still predominantly ambulant, great numbers are included who will get out into the sunshine only if they live on the ground floor. In a 1500-bed hospital at least 800 patients should be accommodated in one-story structures. Approximately half of the last 700, therefore, will live on the first floor of two-story structures. To have all patients on the ground level would make a still better arrangement; this compromise puts 350 upstairs.

Administration Building: The administration building, though relatively simple, should by no means be an ugly structure. Its proportions and the style of its facade will convey to the people of the community the concept that the commonwealth has a gracious interest in its sick citizens. Its location should be determined by ease of approach for the many visitors who will be coming to it on a variety of errands, and it need not be in any definite relation to the buildings that house patients. In front or at the side should be ample parking space for visitors. Cars belonging to officials and personnel should never have reason to take up the public parking space, but should stand behind the building. A porch of good proportion and ample size should accommodate those who come in a storm or on leaving have occasion to wait for someone to pick them up. The lobby should not be cramped but of sufficient size so that people can sit in comfort, and need not be elbow to elbow on uncomfortable benches, staring at bleak pillars or ugly elevator wells while waiting for contact to be made with those whom they are to interview.

Near the entrance and well marked by an ornamental sign should be the information desk. Needless to say, a person of tact and good appearance

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should always be on duty at this spot. It is better that the telephone exchange should not be in sight during the day. It is practical to have it in a room adjoining the information booth so that the night man can serve both switchboard and counter.

The clerks and accountants that are needed to take care of the business of even a modest-sized mental hospital should be so placed in this building that their air and light will be good and that they will not interfere unnecessarily with each other in conversation or the operating of machines. The business manager's office will be on this floor. It should be so located that department heads coming to see him will wait conveniently in a place where they can talk about the affairs of the hospital without being overheard by miscellaneous visitors.

Two public telephone booths should be located unobtrusively in a ventilated room or alcove near the business offices.

Climbing from the lobby should be an ornamental staircase leading to the second floor, where the superintendent and perhaps the assistant superintendent may have offices. Here also should be the Board Room. The architect should resist any tendency to make this official meeting place mean or unattractive. It should be of liberal size so that all sorts of conferences can be held in it. If possible, a door from the superintendent's office should lead into it.

Several offices should be laid out on this floor. With the changing demands of the time, it is not necessary to assign them all beforehand. No administration building ever has too many of them and in many hospitals what were once bedrooms have had to be converted, and with some difficulty.

Ample plumbing facilities are needed in this structure. It should have liberal space in fireproof vaults for the storage of records, particularly protecting current histories from fire. This building can be advantageously connected with others by a passage above or below ground.

Patients' Housing: The following scheme for patients' residence buildings makes easy a classification by type and conduct. It should be understood that the bed capacities of the several buildings need not be scrupulously adhered to. A few more or less beds may be consonant with the architectural scheme and will not require material changes in staff organization or service facilities.

TABLE I—DORMITORY BUILDINGS

Building	*Class of Patients*	Beds for Men	Beds for Women	Total Beds
Dix Villa	Recent Admissions	40	40	80
Brill Building	Progressing	50		
Salmon Cottage	Progressing		50	
McFarland Mansion	Progressing	50		
Brigham Pavilion	Progressing		50	200
Gray Building	Medical & Surgical	30	30	60
Bell Building	Chronic Illness	60		
Ray Retreat	Chronic Illness		60	120
Woodward Infirmary	Tuberculosis	40	40	80
Galt Infirmary	Infirm	100		
Burgess Infirmary	Infirm		75	
Cowles Infirmary	Infirm	100		
Copp House	Infirm		75	350
Rush Retreat	Disturbed	70		
Beers Cottage	Disturbed		60	
Tuke Lodge	Disturbed		60	190
Bucke Home	Inactive	60		
Earle Hall	Inactive		60	120
Workman House	Industrial		75	
Barrett Cottage	Industrial	75		
Pinel Retreat	Industrial		75	
Drewry Grange	Industrial	75		300
Total Beds		750	750	1500

These buildings have been named, each for some person of outstanding service to the mentally ill. No living person is included in this list. It is recommended that the names less well recognized in the neighborhood where the new hospital is to rise shall be replaced by names of those who in the same region have devoted their talent and interest to the welfare of our patients.

Grouping: It is obvious that grouping of buildings is desirable. The reception and progress buildings will be on the same part of the grounds, with considerable spread between the men's and women's houses. The buildings for physically ill will be convenient of access from all directions. The disturbed will be near the places where the most vigorous play and work is readily available.

Acute Group: The admission rate for this hospital may run from five to eight hundred per annum. In providing for the incoming patients, we might speak of an admission group of buildings rather than simply an admission building. There is a widely held belief that many patients should be allowed to spend their whole hospital life in the building to which they are admitted, to save them from association with older patients whose conduct may be objectionable to the newcomer. This then is made the excuse for developing huge admission buildings, even up to a capacity of several hundred beds. The result is unfavorable, for a considerable number of patients who ultimately recover are very difficult and even very disagreeable companions during the height of their illness. The new patients should therefore have several buildings of modest capacity.

Reception Building: The reception building itself will have 80 beds. It should be a comfortable, attractive building, set by itself in such a way that the terrain or foliage will make it seem to the new patients entirely separate from the main part of the hospital. The contours of the land should be skillfully employed; the building should seem to melt into its surroundings and should be so treated architecturally that the new patient and his relatives will get the impression of entering a comfortable mansion rather than a place of detention. This demands considerable skill on the part of the architect, since detention—and very carefully worked-out detention—is highly necessary in the handling of patients who have just come to the hospital, many of them in a desperate frame of mind in which they will show considerable ingenuity in seeking opportunities to hurt themselves. The building should not be over two stories in height. It is well to have a shelter under which the vehicle in which the patient comes can stop.

The lobby should be of considerable size, comfortable and attractive. Extra cubage here is a good investment for public relations, since the patient and his relatives are likely to come to the hospital perturbed and unhappy, and if well received and given a comfortable and pleasant place in which to await the admitting physician, their attitude may be favorably affected for some time to come. There will be also an admission suite, affording privacy to patient and relatives. This building should have many conveniences for diagnosis, but without duplication of everything provided in the surgical building. For instance, portable x-ray apparatus is adequate in the receiving building, and the heavier fixed apparatus will be installed near the surgical suite in another building. The reception service should have comprehensive provision so that any kind of patient can be taken care of for at least a few days in such fashion that his own

interests will be served and he will not be a disturbance to others.

There will be three units for each sex. One unit should be designed especially for disturbed patients, with sound-deadened ceilings, tubs for the prolonged bath close by, and space enough indoors and outdoors for plenty of exercise by restless patients without their being observed or observing quieter patients in other wings. There will be single rooms and some small dormitories. The total number of beds is to be 12. The second unit should be for very depressed patients. Here observation should be easy without being obstrusive. Sometimes these patients bitterly and pathetically lament the necessary watching, hence the watching should be camouflaged so far as possible, but thorough. Alcoves will be provided here, but not single rooms. There will be space for ten patients. The third section should be well planned but is less of a problem than the other two. Here will be the quiet, well-conducted patients, of whom considerable numbers come into the hospital month by month. So far as is possible, they should be free from having to listen to the disturbed or look at the depressed. Eighteen beds will be sufficient, about one-third of them in single rooms and the rest in two small dormitories.

The dining room should have comfortable accommodations for 70 patients. Separate dining rooms for men and women are not essential, but it is advantageous to arrange such a layout that a few uneasy patients can be seated around a corner where they will not be in everybody's view. There must be suitable arrangements for feeding a variable number of patients in the wards. The disturbed section must have its own bathing and feeding facilities. The other two sections can use the same facilities, though it would be still better if the toilet spaces were entirely separate. One pantry can serve all three units for one sex. There should be enough equipment in this building for a modest amount of special diet distribution.

The number of physicians assigned to this service will depend upon the rapidity of turnover. A senior physician will be in charge. At least one other physician ought to be a man of considerable experience. One or two should be young men who are learning methods of work and will in from six months to a year be transferred to other services. A rough index of medical needs should be one physician to about 100 annual admissions.

In this building is the supervisor's office for the reception and progress group. The group of buildings should have a supervisor and 3 assistant supervisors. In the reception building the ward personnel should number 41 which would include 6 charge nurses, 12 general duty nurses, and 23 attendants. Thirty pupil nurses may work here; they give service about one-third of their working day. The building should rate also an assistant dietitian, a diet cook, and an occupational therapist. The occupational therapist should have conveniences in this building for bringing work to the patients even while they are in bed, as well as during the time when they can go out of the ward into a neighboring room especially arranged for this purpose.

Progress Houses: Since many patients are likely to recover within three to six months, structural arrangement should be made so that the younger patients will not spend any time mixed in with older patients who have confirmed mental illness. This involves the provision of some buildings near the receiving building, designed to carry these patients through their illness. These buildings may be called "convalescent houses," but as a matter of fact they should not be planned along the lines of the easy-going self-supervision that ordinarily characterizes a convalescent building. Two buildings of 50 beds for each sex are desirable; probably one of each can be characterized as a convalescent building, and can be operated most of the time as an "open" cottage—left unlocked all day. The two larger ones should be built and equipped with a view to caring for patients who are somewhat disturbed—that is, restless, argumentative, perhaps loud-spoken—a great deal of the time. Some of them may become considerably disturbed now and then. It is not to be expected that these two cottages will carry so active a group as are found in the disturbed section of the reception building, but one service will supplement or alternate with the other in carrying the heavier load, as the flow of admissions may dictate. It will be convenient to have a battery of two tubs for the prolonged bath in these buildings also. Buildings like these should have facilities for washing, cleaning and pressing, making lunches, hairwashing, mending. A typewriter should be available to those that know how to use one, and at times instruction in the use of that machine should be given. Somewhere in this group of buildings should be a hairdressing room and a barber shop.

The nursing complement for these four buildings should include 8 graduates and 18 attendants. There should be conveniences for off-hour occupation, but these patients in daytime can go to the shops.

Sick Service: The service for the physically ill will need to be larger than used to be the practice. The number of cases of acute illness is probably no greater than it has been for a decade, but the number of cases of chronic illness increases from year to year with the rising average age of the hospital population. This process may go on for some years more, hence accommodation for the physically ill will hardly be planned with too great liberality. We propose that 180 beds be set aside for this service, this to include a building for 60 physically ill patients, more medical than surgical. The other 120 patients will be in neighboring buildings; they are chronically ill in some way, and need to spend a great deal of time in bed. These buildings will not include all bed cases, because in some wards are apathetic persons who seem to have no physical illness, but whose state of mind is so languorous that the bed is the only place in which to give them suitable attention, at least a large part of the time.

Each of these three buildings will be subdivided into small dormitories (6-12 beds) and single rooms in such a way that great flexibility will result. Special treatments, new and old, can be easily accommodated. A group can be assembled conveniently for insulin therapy, malaria therapy, penicillin therapy, or some as yet undiscovered therapy, and kept separate from other groups.

Medical and Surgical: Service for the physically ill should have suitable accommodations for the physician's work and very convenient arrangements for the nurses. Office space, utility rooms, janitor's closets, supply closets, should all be as well planned as in any general hospital. The physician's office should adjoin suitable examining rooms. Nurses' offices should be centrally located so that while the nurse must be in the office she can see the majority of patients and the patients can have a reassuring view of the nurse even while she is doing her paper work. Utility rooms and janitor's closets must have light and air, and proper provision for brooms and mops is important. If any building on the grounds is to go above two stories, this is the one where such elevation would have the best excuse. The surgical suite could be put on the third floor far away from traffic and noise. Upper decks or porches should invite the air and sun. Doors to porches and to patients' rooms should permit easy passage of a bed.

The nursing service may have its main office in this building and probably on the first floor, since

many of those who report at that point should not be inconvenienced by having to climb stairs.

Ambulatory Patients: The medical and surgical building should be provided with facilities for a good out-patient department serving the whole institution. The lay of the land will decide on which floor this should be. Let it be remembered that parties of 20 to 40 patients will be brought here from other buildings on some days for such procedures as typhoid inoculation or antiluetic therapy, hence waiting room space should be considerable and not all in one spot, for some of the patients brought here have mannerisms that are unpleasant to others. Good table games and magazines are as acceptable here as in any physician's office. A string of stiff benches along the side of a dark basement corridor is not suitable provision for waiting patients. The out-patient department should have a minor surgery, an eye room, and rooms for the gynecologist and the urologist. Three more examining rooms will cover the medical needs. Here should be the pharmacy and the Roentgenological department.

A senior member of the medical staff should be in charge of this service. He will need at least 2 assistants. If a surgical resident is to be assigned to the hospital, he will of course serve here. The dental office will be located here. Attending specialists will make a great number of visits. As regards nursing, a supervisor will have her office on the service. On duty in the medical and surgical building will be 7 nurses and 31 attendants. About 30 student nurses can get training here. The Roentgenological technician will work here.

Chronically Ill: We propose that for each sex a pavilion be provided to accommodate 60 patients who suffer with chronic illnesses but whose conduct is tolerable. Some will have heart ailments, some an old palsy, some diabetes. Access to the medical and surgical building from here should be easy—that is, on one level. Architectural ingenuity may make one pantry serve both pavilions. For treatment some of these patients can walk or go in wheeled chairs to the out-patient department, but a treatment room near at hand will be needed. Bone surgery can be taken to the medical and surgical building, but minor surgery and other needed procedures for very sick patients must be provided here. In the buildings for the chronically ill will be 6 graduate nurses and 20 attendants.

Tuberculosis: A mental hospital that maintains an active program for the discovery and treatment of cases of pulmonary tuberculosis over a period of years can be expected to have somewhat under five percent of its population thus affected at any time. Provision for cases of pulmonary tuberculosis is seldom too great, for many patients whose disease is arrested do better if continued under the anti-tuberculosis regime, and it is found repeatedly when they are sent back to other wards and given only general supervision that they are more likely to relapse. Accordingly, it is recommended that this 1500-bed hospital have provision for 80 cases of pulmonary tuberculosis divided about equally by sex. The building should be light, airy and cheerful, with broad porches. It will have an excellent dressing room, arranged for minor surgery and lung collapse procedure. Included should be units for quite disturbed patients, perhaps eight of each sex, so arranged that they can have very good care without upsetting their neighbors.

A physician trained in tuberculosis control will be stationed here. Six graduate nurses will be required on this service, and ten attendants.

Infirm: The infirmary service in mental hospitals was always important, and its importance increases every year. Here are patients in many stages of decrepitude, not usually very sick for very long, because they are transferred to the medical building if they can be helped there. But a considerable number of deaths will occur in the infirmaries and there will be many accidents to bone and integument unless the nursing is constant and careful. These are the patients whose condition is likely to be discouraging to the newcomer, and if he sees them he is likely to profess the notion that now he is condemned in this institution to become old, helpless, and forgetful. Accordingly the infirmary buildings should be at some distance from the reception building. They should be one story in height, so placed that a nurse can oversee what is going on in two or three dormitories at one time.

For each sex there will be two buildings of 100 beds each for men and 75 beds each for women; one-story, with clerestory windows. The buildings may be connected with passageways and a common pantry may serve two dining rooms and send trays to the bedfast. The infirmaries should go some distance in meeting the demands often heard that old people be cared for separately. Nevertheless, these infirmaries should be carefully planned so that nursing may be done thoroughly and conveniently, and unnecessary steps avoided.

If the hospital undertakes a course of instruction for "practical nurses," the infirmary wards will be the locus for most of the teaching. One physician will carry the infirmary service for either sex. He may also look after another hundred quiet patients whose quarters are not too far away. The infirmaries should be well staffed, with a complement of not less than 9 graduate nurses and 65 attendants.

The Disturbed: The restless, noisy, and assaultive patients are usually lumped together under the title "disturbed." There is always a considerable number in a mental hospital who win this appellation. The total amount of disturbance at any particular moment, however, depends not so much on the number of irascible people, as upon the kind of care they get. The architect can help in this matter by providing buildings that give the disturbed plenty of room for exercise, and such distribution of space that separation of discordant spirits is easy, and supervision simple. He will provide sound-deadening devices to cut down noise originating inside the building and emerging through the windows. Such a little matter as a second toilet room may be utilized to prevent a world of friction. Acute disturbance is to be expected in the receiving building and special wards are provided accordingly for the patients who come in excited. For other parts of the hospital there are proposed three buildings for the disturbed. One of them will house 70 men. The other two will each accommodate 60 women. In each instance the beds will be distributed about equally between single rooms and six-bed dormitories.

In these wards there will be patients who are not disturbed much of the time but whose state of mind is such that they occasionally commit sharp aggressions against other patients and employees. These wards should be perhaps the most spacious in the hospital; that is, they should have the largest amount of floor space per patient. In this way the friction that develops from intimacy will be forestalled and there will be opportunity for one in a bad humor to walk off much of his discontent.

The prolonged bath should be available in these wards not simply for a few hours in the daytime but both day and night, since disturbed patients often improve greatly with 24 or 48 hours of bath treatment. Personnel should be available for this function and employee salary is soon saved in the breakage that is prevented by calming those who are irritated. The men's building and one of the women's buildings will have two or three tubs for the prolonged bath, near the sleeping quarters. There will be large porches and large dustless playgrounds. The men's building and one of the wom-

en's will have their own dining rooms, preferably with cafeteria service.

Experience shows that results obtained in shortening the duration of disturbance and its intensity are closely related to the degree of skill and the adequacy in number of the people who work with these patients. These wards should rate 9 graduate nurses and 40 attendants. Each service will be in charge of a resourceful and tolerant physician.

Inactive: In any classification of patients there are found a few whose conduct is not objectionable but who for some reason cannot be depended on for much, if any, work. A building for those of this sort in each sex should be provided, 60 beds for each. These should be comfortable residences, but not luxurious. For medical service they will be attached to other wards as may be convenient.

These patients need considerable special attention, most of which will fall to the responsibility of the workers in physical therapy and occupational therapy. Assigned to this service should be six attendants.

Industrial: The problem of the ambulant working patient is relatively simple, yet there is no justification for the development of inconvenient buildings for housing this type of person. Populations change, and buildings for the ambulant and well conducted should be so arranged that they can be converted to other uses without much difficulty. A pleasant arrangement is to keep all patients downstairs during the daytime but have all beds upstairs. Such arrangements are usually broken up, however, by the assumed need of crowding more beds into the day halls. Provision is to be made for about 150 each of men and women of this class, 75 to a building. These patients do the work on the farm and grounds, in the store room, laundry, and kitchen. They ought to have comfortable quarters when work is done for the day. A considerable number of single and double rooms is appreciated. A club room is needed with facilities for entertainment and refreshment, games, reading and smoking. The men need a locker and shower section where they can bathe and change when they come in from work.

The physicians who look after these patients will probably carry additional responsibilities. It will not be necessary to assign graduate nurses here except as one of them (of either sex) shows special aptitude for managing an industrial group. Supervision will assure nursing standards. Twelve attendants should be assigned.

Physicians: The American Psychiatric Association recommends medical positions in the minimum of 1 to 200 patients, and one more for each hundred admissions. This standard would give 12 to 15 physicians to this hospital depending upon the rate of admissions. We will assume an allowance of 12. These 12 staff physicians would ordinarily be distributed about as follows, but this arrangement must be flexible; 1 first assistant, 1 clinical director, 1 pathologist, 5 service heads treating 200 to 400 patients each, 4 assistants.

The superintendent will, within two years, be able to have some personal knowledge of 800 to 1,000 patients. Perhaps the tendency of state government is to require more reading of papers and more signing in triplicate than should be needed in an efficient organization. All this routine deprives the patients of time that should be theirs. The first assistant can easily carry a ward or two where accidents and emotionalism are infrequent, and in this way maintain better knowledge of what goes on in the hospital; for from the mouths of patients issues our most illuminating information. The clinical director, though responsible for many records, should be made highly mobile so that he will know and follow the course of treatment in the acute group, the infirmaries and disturbed buildings.

Four physicians will be assigned to the reception service; three to the medical and surgical service, one to the tuberculosis building, and one to each group of infirmaries. The tuberculosis physician will be able to carry some quiet ward. The disturbed of each sex will need a physician and these two and the first assistant can divide up the other quiet wards.

Offices: Throughout the services, suitable offices and examining rooms for physicians should be provided. Though such arrangements may not be necessary in every building, every medical service should be thus equipped as is already done in some states.

Dentistry: The hospital will need a dentist before its beds are nearly full. The dental department will require an oral hygienist and a dental assistant.

Psychologist: The medical service will be supplemented by the work of a clinical psychologist.

Roentgenology: Some staff physician with good training will oversee the x-ray department and will read the films. The visiting internist or a special consultant will review them. A technician will perhaps be more than sufficient, and can carry additional duty elsewhere in the hospital.

Laboratory: An institution of this size should have a separate laboratory and morgue, very well planned. The Adolf Meyer Laboratory may suitably be a two-story-and-basement structure. Its exact location on the grounds is not especially important, but if the layout permits, it will be not very far from either the medical and surgical building or the infirmaries. Every necessary detail of a fine clinical laboratory service should be worked out by laboratory men who are accustomed to quarters in which they do not need to improvise much. No extensive physiological investigation is envisaged here, but if funds should become available, it ought to be possible without too much difficulty to add space in which to work on special projects. Neuropathology should be well provided.

Two technicians and a janitor will be necessary.

A modern morgue and necropsy room constitute part of the equipment of this building. A small chapel attached to the morgue is appreciated by relatives and personnel.

Nursing: The nursing service will be headed by a chief nurse. Her ranking assistant will doubtless be a man. The hospital will divide into about five supervisory services, and nine nursing supervisory positions will be needed to cover all shifts. Three instructors will be needed. Their principal duties will be with the pupil nurses but they will also have occasion to give lectures and demonstrations to attendants, whether the attendants' course be rated as a "practical nurse" course or otherwise. These instructresses will have some ward duties in order that teaching may not be divorced from practice.

The relief nurses are to take the supervisory posts when officials are off duty. The relief attendants will go to the disturbed and tuberculosis services about half of the time. Other services can assist each other on an hour basis. The quieter services will run without relief.

An educational building, Linda Richards Hall, will stand in the reception group, on the side toward the medical and surgical building. Here will be the class rooms, the professional libraries, and perhaps a pair of laboratories. Not only students of nursing but also students of law, of theology, of dietetics, and of social work will be instructed here.

TABLE II

ASSIGNMENT OF WARD PERSONNEL BY CATEGORIES

	Number of Beds	Ward Personnel Total	Graduate Nurses	Attendants
Administration	—	10	10	—
Instruction	—	3	3	—
Reception service	80	41	18	23
Progressing service	200	26	8	18
Medical & surgical	60	38	7	31
Chronic illness	120	26	6	20
Tuberculosis	80	16	6	10
Infirmaries	350	74	9	65
Disturbed service	190	49	9	40
Inactive service	120	6	—	6
Industrial service	300	12	—	12
Total	1,500	301	76	225

Diet Control: The dietetic organization will include six dietitians, as shown in the following table:

TABLE III—DIETETIC ORGANIZATION:

Position	Number needed
Chief dietition	1
Assistant dietitian, in charge of therapeutic diets and of teaching students and attendants	1
Relief dietitian	1
Staff dietitians*	3
Cooks and helpers	10
Bakers	2
Meat cutter	1

*For reception service, medical and surgical service, tuberculosis service, infirmaries, and disturbed service. Combinations can be made as needed.

There should be one large kitchen from which the mass of the patients will be fed. Adjoining it will be the handsome Ostrander Refectory, where the largest number of ambulant patients will take their meals in comfort and leisure.

Pantries are needed in the reception building, the medical and surgical building, two infirmaries, the chronic illness buildings, the tuberculosis building, and two disturbed buildings.

Occupational Therapy: A department of occupational therapy in some States includes workers who apply various techniques and may be headed by a coordinator of activity and placement. Probably but not certainly this will be a man. The department will include four workers in crafts, two of whom should be registered occupational therapists. A building beautiful in design and finish, the Slagle Shops, will be headquarters for this work. There should be suitable accommodations for 200 patients at a time in this building.

Throughout the institution should be provision for hand work. Wards should have suitable closets for materials and for a loom or two that can be pushed out of the way when not in use. Classes and individual work will be developed all over the hospital. The long and tedious hours devoted by thousands of American patients in mental hospitals to gazing at the floor will be made vastly more bearable in this hospital by having hand work available for a large number of women and a considerable number of men. The latter take less well to doing work at home, but many of them love to put a few rows in a rag rug or run up a quarter of a willow basket during hours when they are not employed outside the ward.

The grounds should be so laid out that in several convenient places patients may plant and tend flower gardens—or vegetable gardens if they prefer.

Physical Training: There should be two physical training aides, one for the patients of each sex. Various groups and some individual patients should be under treatment hour after hour of the day. Care should be exercised not to devolve so many recreational responsibilities on these aides that their time will be frittered away on table games. They should, however, carry a large responsibility for the social dances as well as athletics.

For large athletic affairs, the assembly hall can be used. Nevertheless it is highly desirable that there be a separate gymnasium where chairs may not need be moved about and where disturbed patients can play with abandon.

Assembly: The Drake Auditorium should be placed at some central point, so that patients of both sexes may get to it easily. It should seat 1,000 comfortably. On the whole it is better to have a level floor that can be used for a variety of functions. A good stage with several drops is needed, and suitable dressing rooms with washstands. An ample and well ventilated booth will hold the movie apparatus. Proper trucks should be provided for carrying the chairs under the stage or to some other hidden place.

Recreation: It is well to have a special recreational head though it may be possible to devolve his duties upon other persons. Large entertainments are relatively simple to arrange, especially since the department of physical training should carry the dances. A recreational aide can build up a goodly number of small parties here and there, such as picnics in summer and little parties under some other title in weather that is either cold or wet. The recreational aide should see that religious services are properly scheduled and attended.

Religion: Clergymen usually come on call and receive only a small honorarium. If, however, a resident chaplain of the right type is available, better results can be expected. Probably the assembly hall will have to be used for religious services, though a separate chapel is more convenient.

Library; Music: Special functionaries are the librarian and the musician. Libraries are now well accepted and in some hospitals well developed. The library should be large enough so that a fair number of individuals can read there at the same time and library clubs can be entertained at suitable hours. The work of the musician is not so well established, though notable demonstrations were made many years ago. This work should be developed past the level of mere recreation into a supportive therapy. The librarian should be a full-time aide. The musician may give half time.

Social Service: Social service must be well developed. The head worker should be employed at the time the hospital opens. Additional workers should be engaged to keep the average case load of patients on visit or in family care at about 75. It is anticipated that ultimately there should be 4 workers. The most convenient location of this department is in the reception building.

Canteen: Most hospitals have found benefit in establishing a canteen for the convenience of both patients and employees. Usually it functions best if in or near the assembly hall. Most of them are built too small at first and enlarged later with inconvenience and expense. Access should be easy, and the approaches so planned that litter will not be invited.

Pharmacy: The pharmacy should be preferably in the medical and surgical building, since a large part of its work is for the patients there. It is assumed that no great amount of manufacturing of pharmaceuticals or toilet preparations will be done in this hospital. The pharmacy should be near the out-patient department. Since there is much traffic at the pharmacy, even when a good "leave and call" system prevails, it is important to have a comfortable place for employees and their patient helpers to wait when necessary.

There will be a pharmacist and a helper. Their establishment should be big enough so that they can

work in comfort. Storage space should be nearby—not at an inconvenient distance.

Laundry: The laundry can be laid out on plans shown useful by long institutional experience. It should from the outset be large enough for the work of the completed hospital. The architect should have in mind the comfort of the patients who will do most of the work, when he plans the building and its facilities. Machinery should be modern, and there should also be plentiful opportunity to iron by hand. The building should have provision for sound deadening and for cooling. A rest room is needed for women. Conveniences for serving hot or cold drinks are desirable. Provision for bathing and for changing the sweaty garments of male workers is a health measure. About five employees will be needed.

Employees' Quarters: The employees should be quartered to their satisfaction. Extra plumbing pays rich dividends in employee stability. Washstands should not stick out into the rooms but be in an alcove across from the clothes closet. Closets should be of liberal size, and electric outlets plentiful. All corridors should be sound-deadened. Other features of a good building for employees are less often overlooked than these.

Homes: The quarters for employees need not be so numerous when there is a wide distribution of automobiles. Probably most employees prefer to have their homes in nearby villages or cities. A considerable number like to live in the hospital and it is advantageous to have some such persons always available. Suitable accommodation needs be provided for official and other guests.

Farm: The farm should be fertile. If it be at considerable distance from the residence buildings, a farm colony of 50 beds should be erected and named the Hermitage. This can take the place of one of the buildings that has thus far been planned to go into the main group. Not all the work should be done by machinery; there should be animals on the farm for some of the patients to care for.

Engineering: The powerhouse and heating plant will embody the experience of many years. So far as possible it should be unobtrusive. Its equipment should be the best obtainable. Patients who work there should be provided with reasonable comfort. The mechanics' shops and the garage should be adjacent or at least nearby.

Stores: The storehouse should be amply supplied with refrigeration. The time is near when the quick-freezing process and liberal storage facilities will greatly enrich the diet of our patients in the difficult months of late winter. The storehouse should be so laid out that the storekeeper can maintain control from his desk by observation of all entrances and exists.

Heat: A few remarks may be made about building installations. The time has come when radiant heat should be used in many buildings for mentan patients. The Romans used it 2,000 years ago. Recent developments in general hospitals and other institutions show that it is feasible to install it now. When radiators and certain supply pipes are abolished from the wards for the disturbed, for the depressed, for the epileptic, and for the feeble and confused, the cause of many accidents will be done away.

Radiators should be hung from the wall rather than supported on the floor. Generally they should be set into recesses in the wall. Every such recess should have a coved base without a curb, in order that dust and debris that settles or is thrown behind the radiator guard may be easily cleaned.

Lighting: Half-way measures in lighting should not be tolerated. A competent lighting engineer should pass on all details and assure both patients and employees of the quantity and type of light they need in their various locations. Overhead, many fluorescent installations are called for. Outlets should be numerous. Patients' rooms and dormitories should have at least two circuits, giving much different intensity of illumination for waking and for sleeping hours. Dark corners should be avoided by the use of alcoves, glass brick, and correct lighting fixtures.

Plumbing: Plumbing should be of sturdy type. In one of our finest general hospitals it was decided to make fixtures for the psychiatric service 25 percent stronger than those in the rest of the institution. Both washstands and toilet seats should hang from the wall. Urinals should be of the straddle type. Exposed pipes are objectionable and vulnerable. Buried pipes are highly undesirable. Pipe galleries should therefore be installed, and preferably with such arrangements that the steam fitter can go from basement to attic through these galleries without entering a ward.

Pipes: Different colors of paint should be applied to the various systems of pipes so that hot water, cold water, steam, gas, and any other type of content can be spotted immediately by a new mechanic by the color of the pipe.

Ornament: An occasional arch, a graceful pillar, or an ornamental metal screen may break the lines of a ward very helpfully. To make a building for human beings look like a barn or a barrack may save a little money; it can increase the discomfort of the patient and impair to a surprising degree the esteem that the relative should have for the institution.

Quiet: Sound-deadening has now been accepted as desirable. In every fireproof building it should be considered necessary. Echoing noises are very destructive to peace of mind, and therefore are detrimental to the patient and impair the efficiency of the employee.

Floors: Coved terrazza bases should ordinarily be employed throughout the wards. At about six inches from the base, the main floor should be laid. This can be of wood if kiln dried lumber of the best grade is available. Otherwise asphalt tile (not spread asphalt) may be satisfactory. No floor is finer than battleship linoleum if it is thoroughly cemented to the floor.

Thresholds should not be used inside a ward nor between any ward and its porch. Thus beds may be wheeled freely from room to room and from room to porch. The room doors should be wide enough to allow the passage of a wheeled bed without abrading the door casing.

Doors: Doors of rooms should in many instances be slatted affairs so that free ventilation is available but at the same time the patient has the gratification of her own private quarters. There should be no wretched little peep-holes. A large diamond-shaped pane, a round pane with the appearance of a port hole or two or three oblong panes set side by side are arrangements that allow quite adequate supervision without giving the patient the constant apprehension of being spied on. Or one may install a half-door of glass or screen with one-way visibility.

Hardware: Hardware should be given careful consideration and decisions should be based not alone on initial cheapness. Articles of genuine quality are in the long run more economical than those that have a lower initial cost but require much repair.

Locks: A master key system of bit locks should be set up. There may be a few private closets—such as the narcotic closet—that will require a cylinder lock. Generally speaking, cylinder locks should not be used in the wards.

There should be separate keys for the men's and women's wards but no employee should be required to carry many keys in order to go wherever he may need to. This burden is avoided by use of a

good master key system. The dead lock is much preferable to the spring lock. The usual American doorknob should be replaced in many of the wards by a less obtrusive handle. A recessed grip is clean and safe. Many room doors should be supplied with noiseless spring friction stops.

Nurse's Room: In every type of ward, study should be made of the best place for the nurse's room. This is of great consequence in the disturbed and receiving wards, but the same principles should be followed by the architect everywhere. Even if the nurse need not feel concerned to see or hear patients when she is doing her paper work, it is nevertheless of great importance that any patient shall be easily able to see her and thus feel reassured. Accordingly the nurse's office should be at a point observable from all parts of the ward and should be well glazed.

Lockers: Attention should be paid to supplying suitable places for patients to keep their treasures. This is neglected in too many hospitals. Some have spacious lockers, and capacious bedside stands. Whatever seems most desirable for a particular ward should be decided on and made available.

Guards: Window guards should be a matter of special study. Perhaps the most practical method available in wards where detention is necessary, is an ornamental guard outside the lower sash and a window stop that prevents the upper sash from being lowered more than five inches, except when the stop is unlocked by the employee's key. What is apparently a better arrangement is the Trulock screen or something similar. There must be some mechanical detention, since many patients would climb through a convenient window if they could, but it should be as unobtrusive as possible. In this way it resembles the methods of the nurse whose muscles may be not powerful but who supplements them by the broad application of her intelligence.

Development: One may venture to hope that a different procedure will be followed in opening this hospital, from what has never been done before. The number of transfers from other institutions should be extremely small—not over 15 of each sex. These should be working patients whose help is needed to set the institution going. The hospital should then be allowed to fill gradually from its own district. Opportunity will thus be afforded to set new standards instead of accepting those that come with some hundreds of friendless patients transferred from a metropolitan area. In time every hospital comes to have its own individuality but that time may be long postponed by filling up great areas of its beds with patients whose way of doing things is well established, and unfortunately in unpleasant patterns.

Positions: The following list of positions not mentioned in discussing the wards is intended to cover roughly the probable needs of this institution. In several instances the allowance may be too small. Particularly during a period when a hospital is getting organized, it takes more persons to operate it smoothly than is the case after four or five years when its procedures are well established.

The domestic service will require a housekeeper, perhaps 8 maids and 20 dining room attendants. No doubt 2 janitors will be needed for male quarters and the administration building. Total—31.

Maintenance operations call for not less than 4 engineers, 13 firemen, 2 plumbers, 2 electricians, and 1 sewage plant operator. Total—22.

Mechanics, carpenters, and painters will number not less than 10.

Industrial workers are the cobbler, printer, repairman, and sewing room director. Total—4.

Transportation will require 8 chauffeurs and automobile mechanics.

For the operations in and about the buildings there will be 8 laborers.

The farm and garden will require 10 workers ranging from farmer to groundsman.

Inside staff will include 2 storekeepers, 1 accountant, 14 stenographers and typists, 12 clerks, and 3 telephone operators. Total—34.

Miscellaneous functionaries are 1 fire marshal, 1 guard, 2 barbers, and 1 beautician. Total—5.

TABLE IV—SUMMARY OF PERSONNEL

Positions	*Number*
Physicians	13
Dentist	1
Psychologist	1
Graduate nurses	76
Ward attendants	225
Occupational therapists	5
Physical training aides	2
Librarian	1
Musician	1
Social workers	4
Oral hygienist	1
Dental assistant	1
Laboratory technicians	2
X-ray technician	1
Pharmacist	1
Pharmacist's helper	1
Dietitians	8
Cooks, helpers	10
Bakers	2
Meat cutters	1
Dining room attendants	20
Barbers	2
Beautician	1
Laundry workers	6
Housekeeper	1
Maids	8
Janitors	2
Engineers	4
Fire marshal	1
Firemen	13
Plumbers	2
Electricians	2
Sewage plant operator	1
Mechanics, carpenters, painters	10
Chauffeurs, automobile mechanics	8
Laborers	8
Industrial workers	4
Farm, garden workers	10
Guard	1
Storekeepers	2
Business manager	1
Accountant	1
Stenographers, typists	14
Clerks	12
Telephone operators	3
Total	494

Total employees to patients—ratio of 1 to 3.
Nurses and attendants to patients—ratio of 1 to 5.

In comparison with the requirements of other types of hospitals, these allotments of employees are modest. In comparison with what is ordinarily allowed in a mental hospital, they are unusually generous. It is a matter of common knowledge among those who care for the mentally ill that best results are reached when personnel is strong. Any experienced hospital worker is in position to predict confidently that this projected institution will be able and should be expected to produce very good results.

This study was prepared under the auspices of the Mental Hospital Survey Committee: Arthur P. Noyes, M.D., Chairman; S. Spafford Ackerly, M.D.; Louis Casamajor, M.D.; Ross McC. Chapman, M.D.; Franklin G. Ebaugh, M.D.; Robert H. Felix, M.D.; Clarence M. Hincks, M.D.; Lawrence Kolb, M.D.; Winfred Overholser, M.D.; Frederick W. Parsons, M.D.; Arthur H. Ruggles, M.D.; William L. Russell, M.D.; George S. Stevenson, M.D.

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